

Proposed Technical Feasibility Analysis for the Renewable Electricity Standard

Introduction

Air Resources Board (ARB/Board) staff will conduct a technical feasibility analysis of its proposed regulation to reduce greenhouse gas emissions, consistent with achieving a 33% renewable electricity standard (RES) by 2020. The analysis will be conducted in cooperation with the California Energy Commission (CEC), the California Public Utilities Commission (CPUC), and the California Independent System Operator (CAISO).

The analysis will focus on a 2010 to 2020 time period and consider the availability and potential development of renewable resources within California and those connected to the Western Electricity Coordinating Council (WECC). In addition, staff will consider the effects of the proposed regulation beyond 2020 and evaluate the feasibility of establishing targets beyond the 2020 goal.

Staff will rely primarily upon the technical analyses which have been completed, or are being conducted by the energy agencies with input from the stakeholder community. These studies will be adjusted to provide specific modeling inputs, described below, for the technical feasibility assessment of the RES. The assessment will consider scenarios for attaining a 33% renewable standard based on the potential level of the load to be served, alternative renewable resource mixes, and potential conventional generation and transmission build-out options, which have been identified by the energy agencies for possible achievement paths.

The assessment will not select a preferred resource build out or choose among technologies, but will assess whether the RES will be feasible through various possible compliance scenarios.

Not all potential scenario options have been or are being studied at the same level of rigor, so staff expects some scenarios to be assessed in greater depth than others. The assessment may start with a limited set of options and consider more over the regulation development process as information becomes available. The more speculative compliance scenarios will be discussed in qualitative terms.

All compliance scenarios will strive to identify the amount of incremental renewable generation needed, environmentally preferred development locations, transmission needs, and capital costs for generation and transmission development. For some scenarios, information relative to operational costs,

system integration costs and impacts, and greenhouse gas emissions may also be evaluated.

ARB staff will also determine whether current RPS program provisions should be carried over to the RES. Staff intends to assess the impact of potential changes to the eligibility rules, use of renewable energy credits (REC), out-of-state delivery requirements, and potential metrics for measuring compliance with the regulation. These assessments, however, will not be part of the scenario modeling. An outline of the scope of the analysis for potential compliance scenarios follows.

Plausible Compliance Scenarios

Identification and evaluation of potential implementation or compliance scenarios will be a foundational element of the feasibility analysis. The energy agencies have developed a set of compliance scenarios or paths, building upon the cases studied by the CPUC in its June 2009 preliminary 33% RPS implementation study. The scenarios or cases to be examined include:

- A 20% RPS scenario that is comprised of California's likely renewable energy mix in 2020 based on current state law and existing RPS contracts; and
- A 33% RES scenario that reflects the procurement trajectory of large investor- and publicly-owned utilities.

The following outputs can be derived from technical studies already completed or underway to examine these cases:

- Renewable resource mix by technology and location
- Portfolio cost (both capital costs and integration costs)
- Implementation assessment, including generation and transmission timelines
- Renewable resource zones selected
- Conceptual transmission lines selected¹
- Generation and transmission timelines
- GHG emission implications
- Grid reliability, including system operational requirements and impacts

¹ In the timeframe of this analysis, it is expected that only conceptual transmission studies will be used for assessment of needed transmission lines and costs. There are several such studies already completed, including analysis by the Renewable Energy Transmission Initiative (RETI), which can be found at <http://www.energy.ca.gov/reti/index.html>; and the ISO's recent analysis of conceptual transmission in its balancing area, which can be found at <http://www.caiso.com/242a/242ae729af70.pdf>. The next phase of state-wide conceptual transmission planning is underway under the California Transmission Planning Group. During 2010-11, it is expected that more in-depth transmission planning will take place under which final transmission projects will be advanced to relevant planning boards and regulatory authorities.

In addition, the 33% RES case above will be assessed under three load variations, reflecting different levels of demand-side measures (energy efficiency, renewable distributed generation, and combined heat and power (CHP) systems).

All load cases will be based on the revised 2009 IEPR demand forecast. A High Load case will be the IEPR forecast itself, which includes “embedded” effects of demand-side measures at certain levels, but no incremental impacts. A Low Net Load case will assume incremental impacts from full achievement of Scoping Plan demand-side measures. A Mid Net Load case will assume a reasonable estimate of incremental impacts in the middle range.

Staff anticipates updating this analysis based on additional work being conducted by the energy agencies and the CAISO. The CAISO is currently undertaking a 33% RPS operational study due for completion in late January. In addition to the generic scenarios noted above, that study will conduct analysis of operational impacts for additional renewable supply cases, including high distributed generation and high out-of-state resource cases. In the first quarter of 2010, the CPUC anticipates updating its analysis to refine the 33% Reference Case and include a range of plausible alternative procurement strategies, based on a more realistic implementation assessment of the original alternative cases. These updates are anticipated to provide the full range of outputs identified above for a broader range of plausible alternative cases.

Additional analyses to address potential implementation options from the draft RES Concept Outline will also be included. For example, the Concept Outline discusses extending RES eligibility to individually metered PV and other renewable resources, deducting certain distributed generation and future vehicle charging requirements from utility loads, and allowing the use of unbundled Renewable Energy Credits (REC) connected to the WECC transmission system.

In addition to describing the scenarios that will be examined, the modeling analysis will identify its purpose, process, and timeline, describe the modeling tools and reference materials to be used, and identify modeling periods and progress targets.

Other proposed technical components of the feasibility assessment that may not be addressed in the modeling analysis, but which will need to be addressed by the RES regulation include:

Site and Resource Availability

The analysis will rely heavily upon the work conducted by the interagency Renewable Energy Transmission Initiative (RETI) on the identification and potential development timeframe of large-scale renewable resource areas within California, and on the CPUC analysis of implementation timelines.

Transmission Access/Grid Improvement Needs

The feasibility analysis will incorporate various plausible compliance scenarios from a transmission and distribution perspective. This analysis will also rely upon the RETI work for planned transmission access to, and transmission permitting and development timeframes for, identified resource areas. It could also use, as appropriate, transmission conceptual planning by the CAISO and, if available, the California Transmission Planning Group (CTPG). Renewable resources that have variable output (notably wind and solar) create substantial new operational requirements for grid operations and power markets. To evaluate the system operational requirements, the analysis will also rely on the CAISO-led assessment of the potential system operational impacts associated with renewable integration under various scenarios, including consideration of the impact of unbundled RECs.

Generating Facility and Transmission Permitting and Development

This section will focus on the physical infrastructure and development needs (for various compliance scenarios) required for the RES. Similar to the CPUC's implementation analysis, this section will report on potential development constraints or barriers such as project siting and permitting requirements, environmental impacts, market constraints, technology or manufacturing constraints, needed transmission, contracting and regulatory issues, electricity cost, and project delays.

Program Administration and Administrative Barriers

This section will be designed to clearly define the administrative and compliance procedures for the RES program and the administrative requirements that will apply to various regulated parties. It will consider potential administrative barriers and streamlining opportunities, and evaluate the rationale of extending existing RPS administrative and procedural requirements to the RES. In particular, this analysis will focus on issues related to:

- Program complexity and transparency, including review and certification of facilities, tracking, verification and compliance procedures and timelines, contract review, risk management, cost containment issues, and procurement planning;
- Interaction issues between the RPS program and RES regulation;
- The inclusion of publicly owned utilities as regulated parties and defining the administrative and procedural requirements that will apply;
- Consideration of separate administrative requirements or procedures for public and investor owned utilities;

- Potential modifications to RES eligible renewable resources or applications, certification requirements, or compliance calculation approaches; and

This analysis will also consider and evaluate the role and structure of RES implementation beyond 2020 as well as its interaction with other electricity sector GHG reduction programs, such as the proposed cap and trade program. The analysis will look at the GHG reduction potential of the RES through 2050 and consider emerging technological transformations, such as “smart grid” advances, which may alter the feasibility of the compliance scenarios discussed above. In particular, the analysis will consider whether RES policies and technologies proposed for the 2020 timeframe might constrain more promising renewable technologies or applications in the future.

Recent and Planned 33% Assessment Studies

As noted earlier, the feasibility analysis for the RES will build upon recently completed, or planned, assessment and modeling work for achieving a 33% renewable standard by 2020. Staff will also evaluate any research or studies relevant to achieving a 33% renewable standard, which have been completed by stakeholder groups. Some of the major documents and studies that will be consulted to support the technical feasibility assessment include the following:

California Scoping Plan

The Scoping Plan includes a measure to achieve greenhouse gas reductions through a 33% RPS and outlines potential barriers to be addressed. The measure reflects the joint recommendation of CEC and CPUC in their October 2008, *Proposed Final Opinion on Greenhouse Gas Regulatory Strategies*. In this opinion, the two energy agencies indicate they believe the target is achievable “if the State commits to significant investments in transmission infrastructure and key program augmentation.” Staff will also consider the implementation effects of other Scoping Plan measures on the RES, such as energy efficiency, CHP, the million solar roofs initiative, and the cap and trade program.

CEC Integrated Energy Policy Report (IEPR)

The 2008 IEPR update indicates a 33% renewable target can be reached by 2020 if major barriers are addressed, including transmission additions and upgrades to renewable resource areas, integrating large amounts of renewable resources into the electricity system, reducing renewable contract cancellations and delays, and streamlining permitting procedures for developing generating facilities in environmentally sensitive areas. The IEPR update outlines strategies to address these barriers. Staff will also consult the findings and recommendations of the CEC’s 2009 IEPR when it is released.

CPUC 33% Renewable Portfolio Standard (RPS) Implementation Analysis

The CPUC prepared a preliminary implementation analysis for a 33% RPS by 2020 in June of 2009, conducted within the CPUC's Long Term Procurement Plan proceeding. The analysis examines several resource mix scenarios and implementation pathways, including electricity cost comparisons and plausible goal achievement timelines for each scenario. The study examined a plausible resource portfolio or 33% RPS reference case as well as other cases representing extremes of various procurement strategies, including, a high wind case, a high out-of-state wind delivery case, and a high distributed generation case.

CAISO 33% RPS Operational Study

The CAISO has completed simulation studies to evaluate the operational requirements associated with a 20% RPS, and, as noted above, is currently conducting a study to assess the integration costs and operational needs to feasibly integrate a 33% RES. The study analyzes the same resource cases as were developed in the CPUC's June 2009 33% RPS implementation analysis². Preliminary results are expected in late January 2010. While this study will provide a detailed initial assessment of integration needs, the CAISO stresses that this is not a final verification of the operational feasibility of a 33% RES with current technologies.

Planned Energy Agency Modeling

Staff has been and will continue to consult and work with CPUC, CEC and CAISO staff as they develop the objectives, approach, and outputs of the planned analysis to evaluate the integration impacts of a 33% RES. Staff plans to use the results of the earlier studies, and shape the plausible compliance scenarios to be examined by the planned E3 modeling to support a technical feasibility analysis for the RES regulation.

Eligible Resources

This analysis will be designed to establish a regulatory definition of eligible resources and limitations on eligible resources, and provide a clear basis and rationale for why specific resources are included. The analysis will provide a clear description of currently eligible RPS resources, and any limitations on use, and a clear description of any additional RES eligible resources.

The analysis will generally assume continuation of all current RPS-eligible resources and technologies, including limitations on use, to the RES program. However, the analysis will evaluate the feasibility and potential effects of extending eligibility to certain additional renewable resources or resource applications. For example, the recent enactment of AB 920 allows limited amounts of net-metered, surplus solar PV and wind generation to satisfy utility

² In October 2009, the CPUC's original cases were adjusted to reflect demand scenarios based on the CEC's revised 2009 IEPR load forecast, as inputs to the CAISO's analysis.

RPS requirements, beginning in 2011. The analysis will also evaluate the effects of continuing existing RPS limitations on certain eligible resources under the RES.

Compliance Metrics

The Concept Outline identified two potential metrics for measuring compliance with the RES that will be evaluated as part of the technical feasibility analysis. These included continued use of the RPS metric, where compliance is based solely on megawatt-hour (MWh) of eligible renewable generation obtained to serve a regulated party's load; and a GHG reduction metric that converts MWh of eligible generation into tons of GHG reductions.

Under a GHG conversion metric, a tradable "RES compliance credit" would be created and serve as the measurement basis for compliance. Additionally, resource-specific GHG reduction factors could be applied to convert MWh into measurable GHG reductions by renewable resource type. The Concept Outline also included an option for applying certain load adjustment factors, which potentially would apply to either a MWh or a GHG based metric.

These metric options will be evaluated from a technical and administrative perspective, which consider the role and responsibilities of the CPUC and CEC in RES program administration. As noted in the "Eligible Resource" section above, the analysis will evaluate the effects of assigning GHG reduction values to renewable resources on current and future resource development activities and markets, electricity system impacts and reliability, and potential requirements for supportive, fossil-based energy development.

The technical analysis will also evaluate the feasibility of developing and assigning potential greenhouse gas reduction attributes, relative to the displacement of current generation resources, to various eligible renewable resources for the RES regulation. ARB staff is developing a methodology to assess and rank the average energy and GHG attributes of various renewable resources. The methodology will consider emissions associated with operation and supportive activities of the resource, toxic and criteria pollutant emissions, energy profile and capacity factors, and potential implementation barriers.

Any assignment of GHG attributes would be conducted on a WECC-wide or resource-average basis and not on a generator- or location-specific basis. The results of this analysis will help determine the feasibility, equitability, cost effectiveness, and administrative impact of using a potential GHG-based metric to determine RES compliance.

Purchase and Use of RECs

This component of the analysis will evaluate the technical and administrative feasibility of using bundled and unbundled RECs from renewable generators connected to the WECC transmission system for meeting RES goals. In particular, the analysis will consider issues related to the tracking and trading of RECs through the Western Renewable Energy Generation Information System (WREGIS) and transaction mechanisms to ensure RECs are secured for a single compliance purpose.

The analysis will also attempt to determine the location, amount, and availability of RECs within California and the larger WECC territory, evaluate the power development and transmission implications of expanded use of RECs, and evaluate the appropriateness and effects of imposing any caps or other limits on the use of RECs.

RES Applicability

Staff's draft Concept Outline, similar to the Governor's Executive Order S-21-09, proposed that the RES apply to all public and private entities serving load in California including electrical corporations, electric service providers, community choice aggregators, electrical cooperatives, and local publicly owned electric utilities. Staff is also evaluating the feasibility and appropriateness of applying the RES regulation to California's Department of Water Resources (DWR) and the federal Western Area Power Administration (WAPA), who also serve electricity load in California. Additionally, staff is evaluating the appropriateness of an exemption threshold to provide administrative relief for the State's smallest utilities.

To assess the appropriateness of creating an exemption threshold for the smallest utilities, or utilities with unusual resource mixes (such as extensive, legacy hydropower), the feasibility analysis will identify and rank the load-serving sizes and resource mix of all public and private entities and consider the historical conditions or attributes of their power portfolios. The relative amount and significance of load served by these entities, compared with the State's larger utilities will also be considered.

Staff will also consider the comments received by stakeholders regarding the feasibility or appropriateness of including DWR and WAPA as regulated parties and concerning appropriate portfolio or size levels for any exemption threshold.